

ON THE JOB

Meg-Alert™ Automatic Insulation Resistance Tester

Insulation tester helps treatment plant strike down motor failures

For the Town of Tonawanda wastewater treatment facility, keeping up with growth means more than just expanding the physical plant. It means making improvements that deliver better service at lower cost to customers.

The facility, located just north of Buffalo and about 15 miles southeast of Niagara Falls, New York, serves the Town of Tonawanda, the City of Tonawanda and the Village of Kenmore, with a total population of 125,000. The 30 mgd (75 mgd peak flow) plant serves mainly residential customers, but also several major chemical processing plants in the area.

The Town of Tonawanda also operates a 24 mgd potable water facility, built in 1956, expanded in 1962, and upgraded in 1985 with \$1.5 million in equipment and instrumentation that made it one of the most up-to-date facilities in the nation.

Steady improvement is also a watchword at the wastewater treatment plant, built as part of a comprehensive \$68 million pollution control project that was completed in 1979. The plant, which uses an activated sludge process followed by rapid sand filters for final particulate removal, discharges high-quality effluent into the Niagara River. At the plant, modernization is an ongoing process as engineer Robert Morris and his staff constantly look for equipment and technologies that can cut energy usage and reduce costs for maintenance and repairs.

One example is the new 5 mgd Sawyer Avenue sewage lift station, built to replace an aging 1.5 mgd station no longer able to serve an expanding residential neighborhood on the Niagara



The Town of Tonawanda operates a 24 mgd potable water facility and a 30 mgd wastewater treatment plant near Niagara Falls, NY.

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Robert Morris, Town of Tonawanda

River. The \$800,000 Sawyer Avenue lift station, which went on-line in August 1994, features three 101 HP explosion-proof, submersible motor/pump units with energy-saving variable-speed drives.

These units, installed inside a wet well along with a 5 HP submersible mixer, are continuously monitored by an automatic tester that measures the dielectric strength of the motor insulation. The device will detect any insulation weakness and either trigger a warning alarm or lock out the motor's start circuit, thus preventing a motor failure and costly rewind repairs.

“Motor insulation failure is always a concern in submersible pumps,” says Morris. “The plant's practice is to remove submersible pumps annually for oil changes and other routine maintenance, and every five years for insulation testing, bearing harmonics testing, and reconditioning as necessary. At times, however, motors have failed before the end of the five-year interval.”

“The wet environment is hard on insulation and, unfortunately, frequent manual megohm meter testing on submersible pumps is simply not practical,” says Morris. “Our lift-station pumps have automatic back-up units, so failures do not compromise our operations. But motor repairs resulting from failures are very expensive.”

“Some time ago, we had a failure in a 175 HP motor in a dry well in a lift station. If we could have caught the problem sooner, we could have saved \$5,000 in repair costs. Even for a 15 HP motor, it costs more than \$1,000 to have the unit rewound and sealed. A motor failure on one of the new 101 HP submersible pumps could cost several thousand dollars. We believe that if the insulation tester prevents just one such

failure, it will have more than paid for itself."

Full-voltage testing

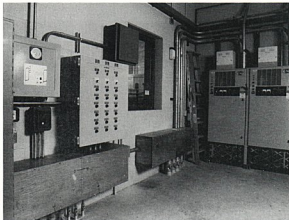
When evaluating motor-protection options for the new Sawyer Avenue lift station, Morris and his staff looked at a device available from the pump supplier that would monitor insulation using a 24V test voltage. However, the Tonawanda staff ultimately chose the Meg-Alert™ insulation tester, supplied by Meg-Alert, Inc. of Minocqua, Wis. "The Meg-Alert™ unit tests the insulation at full operating voltage (500V)." According to Morris, "this provides a much more realistic simulation of actual conditions at motor start-up. In addition, the ability of a single Meg-Alert™ unit to protect all three pumps and the mixer made the installation extremely cost-effective."

The new lift-station pumps and mixer cycle on and off in response to water levels. The Meg-Alert™ unit monitors insulation condition by testing while the motors are idle. It continuously scans all four motors, applying a current-limited, fixed DC voltage to the windings and measuring the leakage current to ground. Readings in megohms are displayed on a universally understood green-yellow-red color-coded meter. The display panel, mounted in the motor control center inside the lift station, is connected via programmable logic controller (PLC) to the system-wide remote monitoring station at the water treatment plant.

Two alarm settings

As configured by the Town of Tonawanda, the Meg-Alert™ unit gives pre-alarm and fault alarm signals. The pre-alarm activates at a higher megohm value than the fault alarm. It signals a potential insulation problem by bringing up a message on the computer screen at the remote monitoring station. This alerts the maintenance staff to inspect for moisture or insulation breakdown.

The fault alarm, activated on detection of serious insulation weakness, triggers a red flashing L.E.D. on the Meg-Alert™ control panel and locks out the motor's start circuit, thus preventing an imminent motor burn-out. A computer message is also received at the remote monitoring station. A manual reset feature ensures that the affected motor can return to



The Meg-Alert™ display panel (upper left corner) mounts in the motor control center inside the lift station. It is connected via programmable logic controller (PLC) to the system-wide remote monitoring station at the treatment plant.

operation only after the fault condition has been corrected.

The Tonawanda staff is considering adding more motor-protection devices as it expands and upgrades facilities across the system. Inside the treatment plant, and in its network of pump stations and lift stations across the collection system, the town has a total of 35 motors larger than 75 HP. These include five submersible units.

"We are looking at installing automatic insulation testers on all submersible equipment in upgrades and new construction," says Morris. "We consider it a good investment that is going to protect our equipment and help us provide cost-effective service to our customers and communities."



If the Meg-Alert™ unit detects an insulation weakness in one of the motor/pump units, a message comes up on the computer screen at the remote monitoring station.

MEG
 **alert™** INC.

8766 Frank Drive, Minocqua, WI 54548 • 715/356-1499 • Fax (715) 358-6099